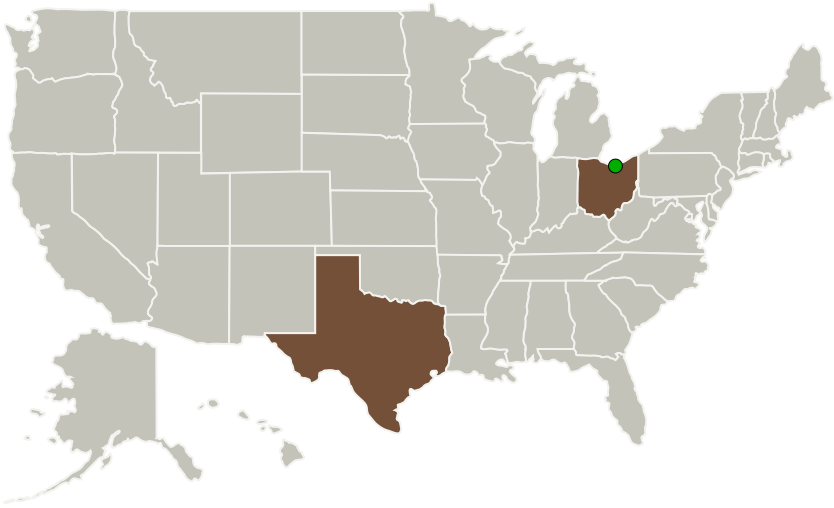
Miniature Intelligent Wireless Fire Detector System, Phase I

Completed Technology Project (2011 - 2011)

Project Introduction

The objective of this project is to develop a wireless intelligent dual-band photodetector system for advanced fire detection/recognition, combining UV/IR III nitride material photodiode structures controlled by FPGA portable circuitry, with a neural network identification capability. Spectral range, detector speed, spatial resolution become critical for fast fire detection as well as for avoiding costly false alarms. Current detectors are bulky, have low mechanical and temperature strength, and cannot be easily integrated into networks. Miniature, chip-based dual-color high-temperature visible- or even solar-blind optical sensor system would allow for fast and false alarm-free fire detection and recognition, thus providing a fast and reliable response in separated UV and IR bands with high spatial resolution, and "smart", artificial neural networks based signal analysis Moreover, development of such sensors will promote fabrication of multi-pixel dual-band UV/IR focal plane arrays with a visible- or solar-blind imaging capability. This project will also consider integration the optical sensor system with existing state of the art smoke sensors for detection of smoldering (flameless) fires as well. One of the approaches for such integration is based on placing the remote high sensitivity dual-band UV/IR focal plane arrays integrated smoke detectors in areas that are prone to possible fires, such as aircraft or spacecraft engines and power circuits. These devices will then communicate with one central control system that analyses the nature and type of flame and sound an alarm accordingly. The second approach is to integrate the smoke and the high sensitivity dual-band UV/IR focal plane array detector into a unit controlled by one system, and then place them in a close proximity of possible fire sources.

Primary U.S. Work Locations and Key Partners



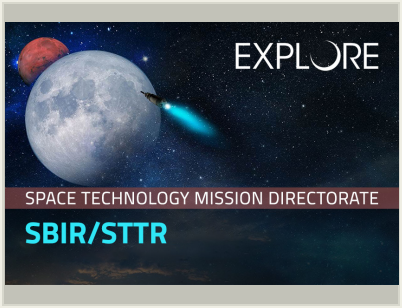


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Table of Contents

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Organizations Performing Work	Role	Type	Location
Integrated Micro Sensors, Inc.	Lead Organization	Industry	Houston, Texas
Glenn Research Center(GRC)	Supporting Organization	NASA Center	Cleveland, Ohio

Primary U.S. Work Locations	
Ohio	Texas

Project Transitions

February 2011: Project Start

September 2011: Closed out

Closeout Documentation:

- Final Summary Chart*(https://techport.nasa.gov/file/138307)*

Organizational Responsibility

Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

Lead Organization:

Integrated Micro Sensors, Inc.

Responsible Program:

Small Business Innovation Research/Small Business Tech Transfer

Project Management

Program Director:

Jason L Kessler

Program Manager:

Carlos Torrez

Principal Investigator:

David Starikov

Co-Investigator:

David Starikov

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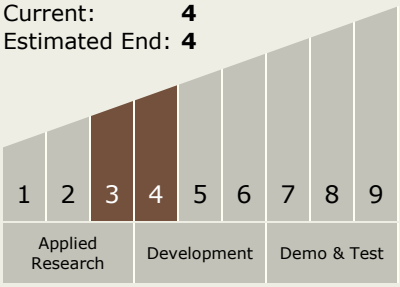
Technology Maturity (TRL)

Start: **3**
Current: **4**
Estimated End: **4**



Technology Areas

Primary:

- TX06 Human Health, Life Support, and Habitation Systems
  - TX06.4 Environmental Monitoring, Safety, and Emergency Response
    - TX06.4.2 Fire: Detection, Suppression, and Recovery

Target Destinations

The Sun, Earth, The Moon, Mars, Others Inside the Solar System, Outside the Solar System